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Deep Space Test-Bed (DSTB)
Engineering Requirements Workshop

This document was developed for potential users of the DSTB in preparation for the upcoming workshop in Huntsville, AL. (June 9&10). It contains some basic information about the balloon-flight environment and questions that relate to the accommodation of experiments on the DSTB. Those questions that are relevant to your particular investigation should be addressed in some detail in your presentation in order to define the engineering requirements for the DSTB gondola. Consideration should also be given to what affects your materials or instruments may have on other co-manifested experiments.

Nominal Flight Environment

Balloon vehicle:

- Balloon ascent rate: 800-1200 fpm
- Balloon rotation rates: < 60 deg/min at float: ~ 180 deg/min observed during ascent/descent
- Altitude: 120 k-ft

Loads:

- Launch: < 1.5 g's
- Ascent: < 1.1 g's due to wind shear, ballast drop, etc.
- Terminate: <10 g's
- Impact velocity: < 20 ft/s

Tropopause:

- Polar: -45C @ ~30-35 k-ft altitude

Solar Radiation:

- Solar constant (seasonal):
  - 1312 W/m2 (minimum),
  - 1358 W/m2 (nominal),
  - 1404 W/m2 (maximum).
- Albedo:
  - 0.9 maximum polar
  - 0.1 minimum

Earth Flux:

- 90.7 W/m2 minimum (cloud top temperatures of 200K)
- 594 W/m2 maximum (desert @ 320K planet temperature)

Individual Investigation Requirements

Mission

- Scientific objective(s) for your investigation
- Exposure duration required for investigation (minimum and desired duration)

- What is the altitude requirement for the experiment (atmospheric overburden)
- What is the altitude stability requirement for the experiment
- List any restrictions for the proximity of the experiment to other equipment, electronics, ballast, or shadowing from the structure.
- How much of the experiment must be recovered immediately after termination?

Mechanical

- Is experiment a detector or material sample
- Mass
- Dimensions
- Will the sensor be self-contained or require a frame/housing to be built for the DSTB?
- Is the sensor to be mounted on a boom extending out from the main gondola structure?

Thermal

- What are the temperature requirements for the experiment?
- Does the experiment require active heating or cooling?
- Is the experiment contained in a sealed canister or exposed to the atmosphere?
    - If sealed, what is the internal pressure

Radioactive Materials/Hazards

- Will you be using radioactive material or lasers in flight?
- Will you be using radioactive material or lasers in ground support?
    - If yes, list radioactive sources/lasers to be used and include their activity/wattage.

Electrical

- How much power does the experiment require?
- Experiment's duty cycle (power profile/timeline)

Data Collection during flight

- Data collection requirement for your experiment on the DSTB
    - internal to your experiment
    - recorded on DSTB data storage
    - telemetry to ground station
- How much data if using the DSTB?
    - Overall Data profile/timeline (rate, duration)

Data Recovery Requirements

- Data is recorded by ground station
- Data is stored on disks or tapes
- Data is contained within detector (i.e. passive detectors)

Communications

- Will the experiment need to be commanded from the ground?
- Does the experiment need to communicate with the ground station during flight?
    - How often, data size and amount
- Is polling required onboard the DSTB?

System/Environment Monitoring Requirements

- What environmental parameters (temperature, pressure) must be monitored and the data provided after the flight?
- What data is needed regarding the incident radiation flux?

Ground Facilities Requirements (CONUS and Antarctica)

Manpower
CPU/communications support
Laboratory equipment
Lifting capabilities
Power
Thermal control
Expendables (gases, etc…)
Technicians (mechanical, electrical)

Schedule

Payload Integration and testing at DSTB facility	May
Integrate Balloon Instrumentation (Palestine TX)	Aug
Transport to McMurdo (cargo ship)	Oct
Transport to McMurdo (Air ship)	Nov
Gondola integration and check-out	Dec
Flight Operations	Dec/Jan
Recovery	Jan
Transport to CONUS (airfreight)	Jan
Transport to CONUS (ship cargo)	Mar